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ABSTRACT

This study of school effects included unique teacher and principal variables: average faculty score on the National Teacher Examinations (NTE) Commons and area examinations, mean passing rate on the NTE of institutions the faculty attended, principal's percentile score on the NTE administration test, and principal's rating on school district interview. The results indicate that school characteristics could account for 8-21 percent of the variance in school achievement, which is somewhat higher than that usually reported. A regression analysis utilizing factors derived from a factor analysis indicate that preparation of faculty was a significant predictor for all three dependent variables. The important roles that teachers and principals play in determining student achievement scores were demonstrated in this study. (Author)

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The Contribution of Principal and Teacher Inputs to Student Achievement

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Running Head: The Contribution of Principal and Teacher

The Contribution of Principal and Teacher

Abstract

This study of school effects included unique teacher and principal variables: average faculty score on the NTE Commons and area examinations, mean passing rate on the NTE of institutions the faculty attended, principal's percentile score on the NTE administration test, and principal's rating on school district interview. The results indicate that school characteristics could account for 8-21 percent of the variance in school achievement, which is somewhat higher than that usually reported. A regression analysis utilizing factors derived from a factor analysis indicate that preparation of faculty was a significant predictor for all three dependent variables. The important roles that teachers and principals play in determining student achievement scores were demonstrated in this study.

While educational researchers have a long history of interest in the correlates of student achievement, it was the Coleman report of 1966 that sparked a dramatic rise in the number of studies in this area. These studies rigorously examined the effects of various aspects of schools and schooling on student achievement. The question they asked was: Do good schools produce good students or is the relationship the other way around? Coleman, of course, concluded that schools, in and of themselves, have little correlation with student achievement. Jencks, et al. (1972), in part replicating Coleman, added to the controversy when they concluded that students did well in life (as measured by occupational status, income, etc.) in spite of rather than because of school (a finding they reconfirmed in Jencks, et al. 1979). In a summary fashion, Alexander, et al. (1978) concluded that most of the variance in student achievement levels was located within rather than between schools and that even then the variance accounted for by school-specific attributes was very small (no more than 7 percent of the total explained variance of student achievement). In recent years, however, a number of studies have concluded that these earlier findings may be somewhat erroneous. Of this group of studies, the work of Rutter, et al. (1979) and Brookover, et al. (1979) standout; as Summers and Wolfe (1977) state: "schools do make a difference."

In a loose sense, all of these studies may be subsumed under the rubric of "school effects." Conceptually this expression is well grounded in sociology, tracing its origins back to Durkheim who argued that out of the interaction of individuals arose a social fact-like

ambience that acts back upon those who produce it. Phrased differently, the whole is thought to be greater than the sum of its parts. Thus schools, in all of their component parts, act upon their students and those who are daily engaged in creating the school environment.

In the present study we seek to add to the attention given to two school-specific sets of variables--those dealing with a schools' teachers and principal. We examine, in an exploratory way, if including school-specific teacher and principal variables add to the total explained variance found in the usual school effects model. Unlike family income, parental education levels, and other such variables (commonly found in school effects models), teacher and principal characteristics represent policy-controllable variables. As an example of this, in very recent years several states have adopted minimally acceptable levels on the National Teacher Examinations (see Piper and O'Sullivan, 1981). This has happened despite the fact that research on the relationship between NTE scores of faculty and student achievement scores is scanty and inconclusive [North Carolina Department of Public Instruction (1981); Piper and O'Sullivan (1981); Strauss and Sawyer (1981)]. Additionally, the potentially critical role of the principal in "setting the tone" (see Havighurst, 1964; Weber, 1971) in any given school has been readdressed (Shoemaker and Fraser, 1981). As an extension of these previous studies, and in the context of school effects studies generally, we ask a deceptively simple question: Do teacher and principal attributes have any measurable effect on student achievement scores when controlling on other common school effect variables?

THEORETICAL PERSPECTIVE

The introduction has served to set the stage for our investigation. In this section we wish to briefly outline the theoretical orientation which our study adopts. Our perspective is akin to that of Glasman and Biniaminov (1981) in that we, too, see the schooling process as a combination of theoretic and policy-laden variables--or, as Glasman and Biniaminov might express it, "manipulable" and "non-manipulable" variables. The model that Glasman and Biniaminov posit is a variation of the standard input-output model but diagrammed and logically positing a causal sequence of variables (in short, a path analytic perspective). Our model, in contrast to this, presents an ordinary least squares (OLS) solution to regressing a dependent variable on several independent variables. Since we use a multi-variate approach, we, like Glasman and Biniaminov, want to assess how much effect any independent variable has net of the other variables in the equation. Thus we report standardized beta weights as our OLS estimates.

Our model includes basically three conceptually distinguishable sets of variables; socioeconomic background, student body characteristics, and school staff characteristics. Our socioeconomic variables include father's education, percentage of mothers who are not in professional occupations, percentage of fathers who are in professional occupations and number of siblings. As school staff characteristics we include percentage of faculty that is white, mean faculty score on the National Teacher Examinations (NTE) commons exams and NTE area exam, mean highest degree obtained by the faculty, mean absences, mean total faculty experience, mean passing rate on the NTE of universities

attended by the faculty, principal's percentile score on the NTE administrator test and principal's rating on an interview by school district office personnel. As student body characteristics we include number of students enrolled in school, student teacher ratio and student achievement scores. For the most part, our variables are common to school effects models and require little explanation (in addition to the studies already cited, also see Perl, 1973 on income; Boardman, et al., 1973, on family occupational status; Bidwell and Kasarda, 1975, on parents' educational level and organizational qualities of school districts; Winkler, on the socioeconomic status of the student population, 1975). However, that is not true for all of them, and we turn now to a brief explanation of our unique variables.

Our teacher variables tap teacher performance as measured by the NTE, teacher commitment to school (as measured by absences), tenure and the mean passing rate on the NTE of the universities attended. The hypothesized relationship between these variables and student achievement posits that teachers with higher NTE scores should (even if minimally) positively influence student outcomes. Teacher tenure and absences represent proxies for the stability to a school's academic environment; the relationship here is the greater the tenure and fewer the absences, the higher the student scores should be. Similarly, a high passing rate on the NTE should reflect better academic preparation for the classroom (an assumption commonly made about graduates of "better" schools almost regardless of their areas of specialization).

Brookover, et al., among others, have pointed out the key role which a principal plays in schools with more demanding academic programs. The principal's role can be one of manager or motivator. In the

former case, the principal serves primarily as a mainterance person. Little, if any, academic expectations are conveyed to the faculty by the principal. If, on the other hand, this does happen, then the principal serves to indirectly impact upon student performance since the teachers reflect, in part, the expectations of the principal--expectations that can become normative when taken in the context of the school as a whole. (In our own research experience, this was the first thing mentioned to us by the superintendent of schools and he told us of administrative changes he had made that had almost immediately served to help create a more demanding academic environment.) While we realize that there are many subtle dynamics to school administration, our inclusion of the principal's NTE score is an attempt to see what, if any, relationship exists between it and student outcomes. Similarly, we inquire into the relationship between principal ratings (done by district staff) and student outcomes.

In sum, it may be said that our model is a theoretically guided depiction of potentially causal influences on student achievement scores. Since we begin with a large number of variables, we realize that (a) not all of them will prove to be of statistical or substantive significance and (b) that it is theoretically plausible that some of our variables would be mediated in a causal flow from exogenous through intervening to dependent variables. Our task is a more modest one in that we simply wish to see which of our sixteen variables are the best predictors and, importantly, which of them are, as Glasman and Biniaminov state, are policy "manipulable."

METHODOLOGY

Data were gathered from forty-five elementary schools in one predominantly urban school district in Louisiana for school year 1980-81. This district was chosen because its central office files contained extensive data on NTE performance by faculty and principals. Given missing data, analyses in this paper are based on thirty-five to forty-five schools, depending on the particular variables in the analysis. [It is important to note that these Ns are comparable to those reported by Brookover, et al. (1979].

Data sources for the analysis included: personnel and student files provided by the district; personnel files provided by the state department of education; and data from state assessment testing, including test scores and information on the socioeconomic characteristics of third grade students (the grade for which district-wide test scores were available). Initially, forty-five variables were included in the dataset. Preliminary correlation analyses resulted in a reduced set of nineteen variables, including sixteen independent and three dependent variables. These variables have been described generally in the previous section, and a complete description is available from the authors upon request.

RESULTS

Descriptive Profile

A summary of the comparison of schools scoring above, equal to, or below the district's average assessment score can be found in Table 1.

Students in schools which scored above the district's average assessment score had the most highly educated parents, the fewest siblings, a greater percentage of fathers in professional jobs, the smallest percentage of mothers in nonprofessional jobs and were in schools which were always majority white. Conversely, students in schools which scored below the parish averages had parents with the lowest educational level, had the most siblings, the lowest percentage of fathers with professional positions and were in schools which were nearly 100 percent black. For every one of the variables in this first set of analyses, students who were in schools scoring equal to parish averages fell between the other types of schools.

[Insert Table 1 about here]

When the results for school characteristics were examined, the results are similar, although not quite so uniformly hierarchical. Notice that the school scoring above parish averages had faculties with the highest Commons and Area scores on the NTE, had a higher percentage of white teachers, had fewer teacher absences, but higher years of teacher experience, more graduate education, a higher principal score on

the NTE administration test, a lower number of total students in the school and a somewhat higher student-teacher ration. Again, the exact opposite held for those schools scoring below the parish averages. Their faculties had the lowest NTE scores, higher absences, and so on. The finding that schools scoring above the average had a higher student-teacher ratio may seem paradoxical at first; however, this can be explained when one considers that the schools scoring below average are the most likely to have compensatory and/or Title I teachers, thus deflating the student-teacher ratio for these schools.

Correlation Matrix

Zero-order correlations among the nineteen variables are reported in Table 2. Several of these correlations are interesting. There is a correlation of .77 between percent of the faculty who are black and percent of the student body who are black. This implies that schools with a primarily black student body also have a primarily black faculty. Race of the student body was considered to be a socioeconomic characteristic, while race of the faculty was considered to be a school characteristic. Other socioeconomic and school (consistent with order below) characteristics are also highly correlated: for example, there is a .63 correlation between father's education of the students and highest mean degree earned by the faculty.

[Insert Table 2 about here]

The two principal variables, the score of the principal on the NTE administrator test and the interview rating given the principal by the central office staff, had a .02 correlation. This implies that the qualities which the central office staff believes will make a good principal are uncorrelated with a measure of the principal's academic ability. In other words, the central office staff looks for characteristics other than academic ability when selecting a principal.

Some high correlations are noteworthy. There is a -.70 correlation between average highest degree faculty attained and average number of faculty absences, which suggests that higher teacher professionalism is associated with fewer teacher absences. Very high intercorrelations occur among the socioeconomic indicators (POPED, SIBS, PCTMNPRO, PCTFPRO and STURACE), as expected.

There are also high correlations among the average scores on mathematics, reading, and writing as expected. These correlations (.85, .88, .93) are high, but not perfect, indicating that each test measures slightly different abilities.

Regression Analyses

As the next step in the analysis, each of the three dependent variables was regressed on the sixteen independent variables. The very small size of many of the standardized beta weights led the investigators to perform stepwise regressions to select the most parsimonious six variable model for each dependent variable. Results for the full and reduced multiple regression analyses are found in Tables 3 and 4.

[Insert Tables 3 and 4 about here]

Results from the sixteen variable model indicate that the socioeconomic characteristics of students alone can explain between 45-67 percent of the variance on the three state assessment scores; school characteristics alone can explain between 56-64 percent of the variance in state assessment scores; together the two sets of variables accounted for 63-76 percent of the variance. Clearly socioeconomic characteristics and school characteristics account for overlapping variance.

As indicated in Table 4, the reduced six variable model is as good a predictor of state assessment scores as the full sixteen variable model when one compares adjusted variance explained using both socioeconomic and school characteristics. School variables alone in the reduced model do not explain as much variance as school variables alone do in the full model. This is especially true when writing is the dependent variable, but untrue when mathematics is the dependent variable.

To further explore the relative contributions of socioeconomic and school variables to performance on state assessment tests, a series of stepwise regression analyses were performed (see Table 5). Socioeconomic characteristics were entered first in the model, followed by school characteristics. Adding school characteristics into the sixteen model increased the variance explained on the math test twenty-one percent (from 42 percent to 63 percent); increased the variance explained on the writing test 14 percent (from 58 percent to 72 percent), and increased the variance explained on the reading test 9 percent (from 67 percent to 76 percent).

[Insert Table 5 about here]

Similar results were found for the reduced six variable model. Adding school characteristics increased the variance explained on the math test by seventeen percent, on the reading test by ten percent, and on the writing test by eight percent.

It should be remembered that several socioeconomic characteristics of the students and school characteristics are highly correlated. The multiple regression models produce results that indicate that these two sets of theoretically distinct variables account for overlapping variance in assessment scores of students. Using the conservative approach of first entering the socioeconomic characteristics into the model and then entering the school characteristics still resulted in the school characteristics accounting for eight to twenty-one percent of the variance in students' scores.

Factor Analysis

Factor analysis is used in this study to determine a smaller set of dimensions that can account for the intercorrelations that exist among the socioeconomic and school variables. Our regression analyses demonstrated that school variables account for a modest, consistent variance in assessment scores above that accounted for by socioeconomic variables. Particular attention will be paid to those dimensions which emerge from the intercorrelated school variables.

The factor analysis reported in Table 6 revealed five underlying dimensions among the variables: (1) a socioeconomic dimension including most of the socioeconomic variables plus three variables generally considered to be school characteristics (race of faculty; mean highest degree attained by faculty; faculty absences); (2) a faculty preparation dimension including average faculty score on the NTE commons examination, average faculty score on the NTE area examination, race of faculty and passing rate on the NTE of institutions the faculty attended; (3) a principal preparation dimension, composed primarily of principal's score on the NTE administrator test; (4) a class/school size dimension including student--teacher ratio and total number of students in the school; and (5) a principal style dimension, composed primarily of the principal's interview rating by the central office personnel.

[Insert Table 6 about here]

These five dimensions were then utilized in a multiple regression analysis (see Table 7) to predict scores on the three dependent variables. The socioeconomic dimension (factor 1) was a highly significant predictor for scores on all three tests ($p < .001$ on two tests; $p < .01$ on the other). The faculty preparation dimension (factor 2) was also a significant predictor for scores on all three tests ($p < .01$ on two tests; $p < .05$ on the other). The school/class size dimension (factor 4) was a significant predictor for scores on mathematics and reading,

while the principal's style dimension (factor 5) was a significant predictor for score on reading.

[Insert Table 7 about here]

DISCUSSION

The school effects literature includes articles with very conflicting results: in some cases schools are thought to favorably impact upon student achievement and in others not. In the present study, it was our intent to conduct school effects research but, and importantly, to include certain teacher and principal variables which have seldom been analyzed and which could affect student achievement. Our results indicate that these inputs do, indeed, have an important impact.

In our models we included average faculty score on the NTE commons and area examinations, mean passing rate on the NTE of institutions that the faculty attended, principal's percentile on the NTE administration test, and principal's rating on a school district interview conducted. These variables were all somewhat unique to our study. Additionally, we included variables commonly found in school effects research (e.g., socioeconomic and school characteristics).

Many of our independent variables were highly correlated with one another. This was true not only among the socioeconomic variables and among the school variables, but high correlations were also obtained between socioeconomic and school characteristics. For example, among our school variables we observed a high correlation between percentage of faculty that is black and percentage of the student body that is black. Given that these schools have been desegregated for some time,

it may be that a kind of self-selection process occurs whereby black teachers eventually teach in a same race school; this is especially likely with senior teachers who get some preference in teaching assignment. Too, this may reflect housing patterns whereby black teachers who live in predominantly black neighborhoods subsequently seek teaching assignments close to their homes. A second example illustrates the interrelationships between socioeconomic and school characteristics. In this case, we observe a high correlation between father's educational level and highest mean degree earned by the faculty. Both this case and the prior one vividly demonstrate that it may be impossible to completely disentangle socioeconomic characteristics and those found in the school (see Hauser, 1971, for more on this same argument). Schools do mirror, to some degree, their own situated economic and class locations.

Those correlation results well illustrate the problem of sorting out the effects of socioeconomic and school variables on student achievement. Our approach was to perform a series of related analyses and then compare the results for commonalities. Two things, in particular, stand out. First, <u>similar to</u> other school effects studies, and despite our rather small sample, socioeconomic characteristics alone can account for much of the variance in student achievement scores. Second, <u>unlike</u> many other school effects studies, school characteristics were highly related to student achievement. This was especially clear in our regression analyses which utilized dimensions derived from a factor analysis of our independent variables. While socioeconomic characteristics were important, preparation of the faculty was a significant predictor for all three dependent variables.

Using a conservative approach in which the effect of the socioeconomic characteristics is taken into account before school characteristics are considered, school characteristics still consistently account for between eight and twenty-one percent of the variance in student achievement. These results are quite different from Alexander et al's. (1978) conclusion that school-specific attributes could account for no more than 7-8 percent of the variance in achievement scores. Our results at least suggest that the inclusion of such things as teacher preparation, principal preparation and principal's style many both increase the explained variance in school effects models and more importantly provide policy related variables worth further analytical consideration.

While this study has been an exploratory one and while the results we report are preliminary, one conclusion seems inescapable: by analytically focusing on certain school-specific qualities, it can be empirically shown that schools do make a difference. This is extremely important since it suggest that "policy manipulable" variables may be both statistically and substantively important. In particular, for us, our findings suggest the need to further explore the roles which teacher NTE scores and principal attributes play in determining student achievement scores. These roles may be more important than previously thought. It remains for school effects researcher to more adequately test the relationships which our study has shown to exist.

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Table 1. Statistical Means of Variables in Relation to the Parish's Average Score on State Assessment Tests, Third Grade Schools

		Above Average[1]	Equal To Average	Below Average[1]
Number of Schools		7	29	9
Fathers' Educational Level	(POPED)[2]	4.31	3.83	3.73
Number of Siblings	(SIBS)	2.64	3.10	3.40
Percentage of Fathers Who Are Professionals	(PCTFPRO)	.40	.18	.07
Percentage of Mothers Who Are Not Professionals	(PCTMNPRO)	.21	.32	.49
Percentage of Students Who Are Black	(STURACE)	.25	.50	.94
Faculty's Average Score on NTE Commons	(NTE COMMON)	564.39	544.35	534.99
Faculty's Average Score on NTE Area	(NTE AREA)	613.13	587.35	586.71
Percentage of Faculty that Is White	(FACRACE)	.61	.52	.43
Average Number of Faculty Absences	(FACABS)	7.28	7.64	8.62
Mean Total Faculty Experience	(TOTEXP)	11.04	10.04	10.01
Average Highest Degree Faculty Received	(FACDEGREE)[3]	2.75	2.62	2.63
Mean Passing Rate on NTE of Institutions Faculty Attended	(UNIVGRAD)[4]	2.03	2.07	2.25
Number of Students	(TOTSTU)	404.57	507.79	463.00
Student Teacher Ratio	(STUTEAR)	26.59	24.19	23.07
Principal's Percentile Score on NTE Administrator Test	(PRINNTE)	63.17	45.46	20.50
Principal's Rating on Interview by District Office Personnel	(PRININT)	76.60	73.75	77.30

[1] For a school to be classified as scoring above the average parish assessment scores, that school had to score one standard deviation above the average parish assessment score on at least two of the the three tests. For a school to be classified as scoring below the average parish assessment scores, that school had to score one standard deviation below the average parish assessment score on at least two of the three tests.

[2] The scale values for fathers' education are as follows: one-completed less than eight years of school; two-completed eighth grade but did not attend high school; three-went to high school but did not graduate; four-graduated from high school; five-went to college.

[3] Scale values for average highest degree faculty received are as follows: one-less than Bachelor's degree; two-Bachelor's degree; three-Masters degree; four-Master's degree plus thirty hours'; five-Educational Specialist; six-Doctoral degree (Ed.D. or Ph.D.)

[4] These data were based on where the faculty received their Bachelor's degrees. Values of one, two or three were assigned to these universities. A value of one indicates universities with the highest passing rate on the National Teachers Examination; a value of two indicates universities with a middle range of passing on the NTE; a value of three indicates universities with the lowest passing rate on the NTE.

Table 2. Correlation Matrix*

	FACRACE	NTECOMMON	NTEAREA	FACDEGREE	FACABS	TOTEXP	POPED	SIBS	PCTNMPRO	PCTFPRO
FACRACE	1.00000									
NTECOMMON	-0.54732	1.00000								
NTEAREA	-0.51168	0.82640	1.00000							
FACDEGREE	-0.54554	0.27228	0.14167	1.00000						
FACABS	0.27595	-0.00740	0.13001	-0.70447	1.00000					
TOTEXP	-0.06383	0.18985	-0.02980	0.61184	-0.48502	1.00000				
POPED	-0.54104	0.32558	0.36063	0.63063	-0.29420	0.37937	1.00000			
SIBS	0.55092	-0.18144	-0.11027	-0.64735	0.47684	-0.36712	-0.60566	1.00000		
PCTNMPRO	0.59323	-0.24603	-0.24143	-0.46015	0.38991	-0.13795	-0.57388	0.55192	1.00000	
PCTFPRO	-0.65693	0.39706	0.39132	0.67858	-0.43873	0.35840	0.78496	-0.55055	-0.75552	1.00000
STURACE	0.77436	-0.36546	-0.24999	-0.68297	0.49759	-0.29802	-0.63845	0.63891	0.82937	-0.72794
TOTSTU	-0.17052	-0.06094	-0.10384	0.34945	-0.20283	0.27151	0.46229	-0.20684	-0.20472	0.23121
STUTEAR	-0.11505	0.18804	0.20824	0.23000	0.00118	0.21992	0.52807	-0.27187	-0.41276	0.30851
UNIVGRAD	0.60638	-0.60785	-0.48437	-0.37643	0.17138	-0.02786	-0.33657	0.25350	0.48590	-0.47371
PRINNTE	-0.22558	0.13593	0.23496	0.00034	-0.07987	-0.35691	0.03402	-0.22566	-0.26701	0.11435
PRININT	0.09229	0.10633	0.06520	0.06715	-0.05542	0.08153	0.03219	0.20731	-0.03729	-0.00005
APCMATH	-0.48675	0.38491	0.32748	0.41622	-0.33535	0.13842	0.49469	-0.51207	-0.54094	0.59539
APCREAD	-0.59976	0.33126	0.29274	0.54026	-0.33785	0.26933	0.60843	-0.68207	-0.71383	0.70877
APCWRIT	-0.63721	0.40609	0.28452	0.52353	-0.37023	0.26176	0.47946	-0.59187	-0.62949	0.67341

	STURACE	TOTSTU	STUTEAR	UNIVGRAD	PRINNTE	PRININT	APCMATH	APCREAD	APCWRIT
FACRACE									
NTECOMMON									
NTEAREA									
FACDEGREE									
FACABS									
TOTEXP									
POPED									
SIBS									
PCTNMPRO									
PCTFPRO									
STURACE	1.00000								
TOTSTU	-0.33009	1.00000							
STUTEAR	-0.40536	0.24821	1.00000						
UNIVGRAD	0.49434	-0.03319	-0.03786	1.00000					
PRINNTE	0.24008	-0.19688	0.15764	-0.19506	1.00000				
PRININT	0.12179	0.01536	0.13101	-0.08696	-0.02395	1.00000			
APCMATH	-0.56001	-0.03532	0.43415	-0.40196	0.35210	-0.11769	1.00000		
APCREAD	-0.73449	0.13143	0.39260	-0.37064	0.34575	-0.22744	0.84664	1.00000	
APCWRIT	-0.65671	-0.00538	0.25040	-0.44205	0.30457	-0.21073	0.87796	0.92650	1.00000

* This correlation matrix is based on data from thirty-five schools; ten of the forty-five schools had missing data on at least one of the variables.

Table 3. Standardized Beta Weights for Full Multiple Regression Models and Variance Explained by those Models

	Mathematics[1]	Reading[1]	Writing[1]
Socioeconomic Characteristics			
POPED	.05	.04	-.17
	(-.03)	(.10)	(.05)
SIBS	-.21	-.29	-.30
	(-.18)	(-.10)	(.09)
PCTMNPRO	-.31	-.34	-.19
	(.14)	(-.49)	(-.60)
PCTFPRO	.15	.11	.32
	(.47)	(.12)	(.13)
STURACE	-.06	-.15	-.20
	(.14)	(.20)	(.65)
Variance[2] Explained (r^2)	.448***	.665***	.583***
	[.377]	[.622]	[.530]
School Characteristics			
FACRACE	-.19	-.41	-.48
	(-.11)	(-.17)	(-.56)
NTECOMMON	.15	-.09	.16
	(.25)	(.18)	(.45)
NTEAREA	-.07	-.01	-.23
	(-.21)	(-.16)	(-.49)
FACDEGREE	.03	.14	.07
	(-.17)	(.17)	(.23)
FACABS	-.30	.00	-.07
	(-.32)	(.14)	(.01)
TOTEXP	-.06	.25	.22
	(-.15)	(.17)	(.21)
STUTEAR	.46	.28	.19
	(.47)	(.07)	(.13)
UNIVGRAD	-.15	-.08	-.10
	(-.15)	(.09)	(.07)
TOTSTU	-.22	-.07	-.21
	(-.18)	(-.07)	(-.18)
PRINNTE	.11	.28	.20
	(.10)	(.26)	(.26)
PRININT	-.19	-.25	-.22
	(-.16)	(-.26)	(-.33)
Variance[2] Explained (r^2)	.564*	.637**	.629**
	[.356]	[.463]	[.452]
Combined Model			
Variance[2] Explained (r^2)	.631	.758**	.723*
	[.302]	[.542]	[.478]

* $p < .05$
** $p < .01$
*** $p < .001$

[1] The first number in each cell is the standardized beta weight for that variable in a model that contains only socioeconomic or school characteristics; the number in parenthesis is the standardized beta weight for that variable in a model that contains both socioeconomic and school characteristics.

[2] The first number in each cell is the unadjusted $\underline{r}^2$; the number in parenthesis is the $\underline{r}^2$ adjusted for the number of independent variables and the number of cases in the model.

Table 4. Standardized Beta Weights for Reduced Multiple Regression Models and Variance Explained by Those Models

	Mathematics[1]		Reading[1]		Writing	
Socioeconomic Characteristics						
SIBS	-.30	SIBS	-.34	SIBS	-.25	
	(-.21)		(-.20)		(-.21)	
PCTFPRO	.40	PCTMNPRO	-.42		.27	
	(.36)		(-.32)		(.35)	
		PCTFPRO	.17	STURACE	-.33	
			(.28)		(-.29)	
Variance[2] Explained (r^2)	.400***		.659***		.562***	
	[.371]		[.634]		[.530]	
School Characteristics						
STUTEAR	.49	TOTEXP	.47	NTECOMMON	.43	
	(.31)		(.15)		(.13)	
TOTSTU	-.15	PRINNTE	.51	TOTSTU	.03	
	(-.23)		(.23)		(-.21)	
PRINNTE	.20	PRININT	-.25	PRININT	-.26	
	(.18)		(-.20)		(-.14)	
UNIVGRAD	-.29					
	(-.09)					
Variance Explained (r^2)	.389**		.360**		.231*	
	[.311]		[.298]		[.156]	
Combined Model						
Variance[2] Explained (r^2)	.562***		.729***		.632***	
	[.478]		[.671]		[.553]	

* $p < .05$
** $p < .01$
*** $p < .001$

[1] The first number in each cell is the standardized beta weight for that variable in a model that contains only socioeconomic or school characteristics; the number in parenthesis is the standardized beta weight for that variable in a model that contains both socioeconomic and school characteristics.

[2] The first number in each cell is the unadjusted r^2; the number in parenthesis is the r^2 adjusted for the number of independent variables and the number of cases in the model.

Table 5. Proportion of Variance Explained Using Stepwise Regression Models.

A. Full Sixteen Variable Model

Subject Area	Socioeconomic Variables Alone	Socioeconomic Plus School Variables	Additional Variance Explained
Mathematics	.4155	.6305	.2150
Reading	.6709	.7577	.0868
Writing	.5830	.7234	.1404

B. Reduced Six Variable Model

Subject Area	Socioeconomic Variables Alone	Socioeconomic Plus School Variables	Additional Variance Explained
Mathematics	.3905	.5628	.1723
Reading	.6612	.7289	.0977
Writing	.5499	.6322	.0823

Table 6. Rotated Factor Matrix* Including Socioeconomic and School Variables

	FACTORS				
Variables	1	2	3	4	5
POPED	-.49	.33	.15	(.67)	-.06
SIBS	(.73)	-.10	.06	-.27	.27
PCTMNPRO	(.64)	-.25	.33	-.43	.01
PCTFPRO	(-.67)	.43	.01	.37	-.04
STURACE	(.75)	-.31	.15	-.39	.17
FACRACE	(.55)	(-.62)	.15	-.13	.26
NTECOMMON	-.08	(.92)	.07	.05	.09
NTEAREA	.06	(.90)	-.09	.15	.03
FACDEGREE	(-.84)	.19	.27	.16	.08
FACABS	(.87)	.14	-.11	.14	-.18
TOTEXP	-.49	.01	(.68)	.14	.19
TOTSTU	-.23	-.13	.38	(.55)	-.12
STUTEAR	-.06	.07	-.11	(.86)	.19
UNIVGRAD	.36	(-.71)	.14	.06	-.04
PRINNTE	-.17	.10	(-.84)	.04	.05
PRININT	.03	.07	.01	.08	(.93)

*This factor analysis employed the principal axis technique, with factoring stopping at eigenvalues less than 1.00. The factor loadings reported here are based on a varimax rotation of the unrotated factor matrix.

Table 7. Standardized Beta Weights for Five Factor Regression Models and Variance Explained by those Models

	Mathematics	Reading	Writing
Factor 1	-.46**	-.60***	-.60***
Factor 2	.33*	.29**	.36**
Factor 3	-.26	-.21	-.18
Factor 4	.28*	.37**	.16
Factor 5	-.06	-.23*	-.19
Variance[1] Explained (r^2) by all Five Factors	.4745** [.3840]	.6808*** [.6258]	.5906*** [.5200]

* $p < .05$
** $p < .01$
*** $p < .001$

[1]The first number in each cell is the unadjusted r^2; the number in brackets is the r^2 adjusted for the number of independent variables and the number of cases in the model.